

CLAIMS

1. A method of controlling data transmission in a multiple-input multiple-output (MIMO) communication system, comprising:

evaluating an ordering for recovering a plurality of symbol streams transmitted from a plurality of transmit antennas, using successive interference cancellation (SIC) receiver processing, to obtain a plurality of post-detection signal-to-noise ratios (SNRs) for the plurality of transmit antennas for the ordering;

determining a data rate for each of the plurality of transmit antennas based on the post-detection SNR for the transmit antenna, wherein the data rate for each transmit antenna is set to zero if the post-detection SNR for the transmit antenna is worse than a minimum required SNR, and wherein a plurality of data rates are determined for the plurality of transmit antennas for the ordering;

computing an overall data rate for the ordering based on the plurality of data rates for the plurality of transmit antennas;

repeating the evaluating, determining, and computing for each of a plurality of orderings; and

selecting one of the plurality of orderings based on overall data rates for the plurality of orderings, wherein a plurality of symbol streams are sent from the plurality of transmit antennas at the plurality of data rates for the selected ordering, and wherein the plurality of symbol streams are recovered at a receiver in accordance with the selected ordering.

2. The method of claim 1, wherein the evaluating, determining, and computing are repeated for at most $N_T!$ orderings, where N_T is the number of transmit antennas.

3. The method of claim 1, wherein the system supports a set of discrete data rates, and wherein the data rate for each of the plurality of transmit antennas is one of the discrete data rates.

4. The method of claim 1, wherein the plurality of data rates for the selected ordering include at least one data rate of zero.

5. The method of claim 1, wherein the minimum required SNR is a required SNR for a lowest non-zero data rate supported by the system.

6. The method of claim 1, wherein the selected ordering has a highest overall data rate among the plurality of orderings.

7. The method of claim 1, wherein the evaluating an ordering includes obtaining a detected symbol stream for each of the plurality of transmit antennas using spatial or space-time processing and in accordance with the ordering, computing the post-detection SNR for each of the plurality of transmit antennas, and estimating and canceling interference due to the detected symbol stream for each of the plurality of transmit antennas except for a last transmit antenna to be recovered.

8. The method of claim 1, further comprising: sending the plurality of data rates for the selected ordering as feedback information to a transmitter.

9. An apparatus in a multiple-input multiple-output (MIMO) communication system comprising a controller operative to:

evaluate an ordering for recovering a plurality of symbol streams transmitted from a plurality of transmit antennas, using successive interference cancellation (SIC) receiver processing, to obtain a plurality of post-detection signal-to-noise ratios (SNRs) for the plurality of transmit antennas;

determine a data rate for each of the plurality of transmit antennas based on the post-detection SNR for the transmit antenna, wherein the data rate for each transmit antenna is set to zero if the post-detection SNR for the transmit antenna is worse than a minimum required SNR for the system, and wherein a plurality of data rates are determined for the plurality of transmit antennas for the ordering;

compute an overall data rate for the ordering based on the plurality of data rates for the plurality of transmit antennas;

repeat the evaluation, determination, and computation for each of a plurality of orderings; and

select one of the plurality of orderings based on overall data rates for the plurality of orderings, wherein a plurality of symbol streams are sent from the plurality of transmit antennas at the plurality of data rates for the selected ordering, and wherein the plurality of symbol streams are recovered in accordance with the selected ordering.

10. The apparatus of claim 9, wherein the controller is operative to repeat the evaluation, determination, and computation for at most $N_T!$ orderings, where N_T is the number of transmit antennas.

11. The apparatus of claim 9, wherein the plurality of data rates for the selected ordering include at least one data rate of zero.

12. The apparatus of claim 9, further comprising:
a memory unit operative to store a set of discrete data rates supported by the system and a set of required SNRs for the set of discrete data rates.

13. The apparatus of claim 9, wherein the plurality of data rates for the selected ordering are sent as feedback information to a transmitter.

14. The apparatus of claim 9, further comprising:
a receive (RX) data processor operative to process a plurality of received symbol streams using the SIC receiver processing and in accordance with the selected ordering to recover the plurality of symbol streams sent from the plurality of transmit antennas.

15. The apparatus of claim 9, wherein the controller is operative to evaluate each of the plurality of orderings based on channel response and noise estimates for a communication link to a receiver.

16. The apparatus of claim 9, further comprising:

a transmit (TX) data processor operative to process a plurality of data streams at the plurality of data rates for the selected ordering to obtain a plurality of symbol streams for transmission from the plurality of transmit antennas.

17. An apparatus in a multiple-input multiple-output (MIMO) communication system, comprising:

means for evaluating an ordering for recovering a plurality of symbol streams transmitted from a plurality of transmit antennas, using successive interference cancellation (SIC) receiver processing, to obtain a plurality of post-detection signal-to-noise ratios (SNRs) for the plurality of transmit antennas for the ordering;

means for determining a data rate for each of the plurality of transmit antennas based on the post-detection SNR for the transmit antenna, wherein the data rate for each transmit antenna is set to zero if the post-detection SNR for the transmit antenna is worse than a minimum required SNR, and wherein a plurality of data rates are determined for the plurality of transmit antennas for the ordering;

means for computing an overall data rate for the ordering based on the plurality of data rates for the plurality of transmit antennas;

means for repeating the evaluating, determining, and computing for each of a plurality of orderings; and

means for selecting one of the plurality of orderings based on overall data rates for the plurality of orderings, wherein a plurality of symbol streams are sent from the plurality of transmit antennas at the plurality of data rates for the selected ordering, and wherein the plurality of symbol streams are recovered at a receiver in accordance with the selected ordering.

18. The apparatus of claim 17, wherein the plurality of data rates for the selected ordering include at least one data rate of zero.

19. The apparatus of claim 17, further comprising:

means for sending the plurality of data rates for the selected ordering as feedback information to a transmitter.

20. The apparatus of claim 17, further comprising:

means for processing a plurality of data streams at the plurality of data rates for the selected ordering to obtain a plurality of symbol streams for transmission from the plurality of transmit antennas.

21. The apparatus of claim 17, further comprising:

means for processing a plurality of received symbol streams using the SIC receiver processing and in accordance with the selected ordering to recover the plurality of symbol streams sent from the plurality of transmit antennas.

22. A processor readable media for storing instructions operable to:

evaluate an ordering for recovering a plurality of symbol streams transmitted from a plurality of transmit antennas, using successive interference cancellation (SIC) receiver processing, to obtain a plurality of post-detection signal-to-noise ratios (SNRs) for the plurality of transmit antennas;

determine a data rate for each of the plurality of transmit antennas based on the post-detection SNR for the transmit antenna, wherein the data rate for each transmit antenna is set to zero if the post-detection SNR for the transmit antenna is worse than a minimum required SNR, and wherein a plurality of data rates are determined for the plurality of transmit antennas for the ordering;

compute an overall data rate for the ordering based on the plurality of data rates for the plurality of transmit antennas;

repeat the evaluation, determination, and computation for each of a plurality of orderings; and

select one of the plurality of orderings based on overall data rates for the plurality of orderings, wherein a plurality of symbol streams are sent from the plurality of transmit antennas at the plurality of data rates for the selected ordering, and wherein the plurality of symbol streams are recovered at a receiver in accordance with the selected ordering.